



## RESPONSE FORM

### Standardization needs and suggestions to EURAMET for consideration in their upcoming EMPIR calls

In the frame of the between CEN, CENELEC and EURAMET, CEN and CENELEC have been invited by the EURAMET Management to put forward their **testing and measurement needs in research** for consideration by metrology institutes for future calls under EMPIR.\*

Relevant technical groups (sector fora, advisory boards, coordination groups, TCs...) are invited to contribute with:

- a short introduction or an overview paper of their unaddressed standardization needs for testing and measurement, and
- a contact person (secretary, chair, convenor, liaison officer, etc.) whom proposers for the Potential Research Topics can contact,

by using this Response Form and send it at any time during the year to:

**STAIR EMPIR WG, Mr Ortwin Costenoble : [empir@nen.nl](mailto:empir@nen.nl)**

Please note that you have an opportunity to discuss this need with a metrology researcher if you or representatives of your group attend the **STAIR EMPIR meeting of 10<sup>th</sup> October 2017** in CCMC - Brussels. Please indicate your interest below.

<b>Source of the identified need</b> (identification of TC, WG, etc, incl. title)	<input checked="" type="checkbox"/> CEN/TC 89/WG 14 <input type="checkbox"/> CLC/TC 0/WG 0 <input type="checkbox"/> ISO/TC 0/SC 0 / WG 0 <input type="checkbox"/> IEC/TC 0/SC 0 / WG 0 <input type="checkbox"/> Other, namely <i>Identification, Title</i>
<b>European entity</b> responsible for submission of the need	<i>CEN/TC89 Thermal Performance of Buildings and Building Components</i>
<b>Person that can be contacted for more detail</b> (name, e-mail and telephone number)	<i>Jiyu Wu jiyu.wu@npl.co.uk 0044(0)20 8943 6045 National Physical Laboratory, Hampton Road, Teddington, TW11 0LW, U.K.</i>
<b>Unaddressed need</b> (short description)	<i>Revise the mandatory limits for equipment performance check and test conditions set in Annex A of CEN/TS 15548-1:2014, with focus at temperatures from 650 °C to 800°C, if possible to 850°C.</i>
<b>Further explanation of need</b> (TC business plan, road map, formal decision, work item, etc.)	<i>Further explanation on the need, why it shall be filled and why specifically related to standard CEN/TC89/WG 14 is responsible for the conversion of CEN/TS 15548-1:2014 to an EN standard: Thermal insulation products for building equipment and industrial installations - Determination of thermal resistance by means of the guarded hot plate method - Measurements</i>

at elevated temperatures from 100 °C to 850 °C. The current status of the work is PWI.

There is also a possibility that CEN/TC89 and ISO/TC163 could establish Vienna Agreement and jointly develop an ISO EN standard. Currently, there is a new work item ISO/AWI 22162 "Thermal insulation — Determination of thermal conductivity by Guarded Hot Plate Method at elevated temperature from 100 °C to 800 °C" in ISO/TC 163/SC 1.

The technical reason to revise the TS 15548-1 into an EN standard is that in the new European Construction Products Regulation (CPR) all the product standards for technical insulations (used at elevated temperatures) are calling for thermal conductivity measurements using the standards, e.g. EN12667 and EN12939 that are only suitable for near ambient temperatures. The current TS 15548-1 inherited criteria from measurement standards for near ambient temperatures, some of them are not appropriate and even not possible to achieve at elevated temperatures. As a result, certified laboratories under CPR are not able to carry out thermal conductivity measurements conforming to the standards specified in the product standards for technical insulation at elevated temperatures. Currently, WG14 is revising the criteria for high temperature measurements based on the studies in the EMRP Thermo project and importantly, consensus reached from multiple (at least 3) reference laboratories. However, the WG14 is not able to complete the revision mainly due to the lacking of data at temperatures above 650 °C for the validation of the limits set in Annex A (normative). The EMRP Thermo project had to reduce the temperature limit from 850 °C to 650 °C due to technical difficulties. However, with knowledge and experience gained in the EMRP Thermo project, it is believed that higher temperature limit, e.g. 750°C/800°C or even 850°C for HTGHP can be achieved in more labs, therefore, can meet the thermal conductivity/resistance measurement requirements set in about a third of the product standards for technical insulation in CPR. In addition to overcoming the temperature limit, there are items remain to be studied in a metrology project.

In a recent WG14 meeting, experts reviewed the Annex A of the CEN/TS 15548-1:2014 "Limits for equipment performance and test conditions". Although some of the limits set in the Annex A can be revised for high temperature measurements based on the studies in EMRP Thermo project, the limits set in the following clauses need further studies in a future metrology project.

CEN/TS 15548-1, Annex A  
A.2  
2.1.4.1.1 Maximum allowed imbalance error 0.5 %  
2.1.1.2 Maximum temperature difference between the average temperature of the opposite surfaces of the heating unit 0.2 K

	<p><i>3.2.1 Maximum value for the sum of imbalance and edge heat loss errors 0.5 %</i></p> <p><i>The limits of the thickness of heater plates need to be determined in order to achieve uniform temperatures at the plate surfaces and at the same time to keep the imbalance error small.</i></p> <p><i>A.4</i></p> <p><i>2.1.1.2 Minimum total hemispherical emissivity for any surface in contact with the specimen 0.8 – although the EMRP Thermo project tested and identified the suitable high-temperature high-emissivity coatings, the service life of these coatings on heater plates still need to be determined.</i></p> <p><i>2.1.1.3 Maximum gap area related to the metering section area 5 %</i></p> <p><i>2.1.1.5 Maximum distance of imbalance sensors from the gap, related to the side or diameter of the metering section 5 %</i></p> <p><i>2.1.4.1.2 Minimum electrical resistance between temperature sensors and apparatus metal plates 100 MΩ.</i></p> <p><i>2.1.4.1.4 Maximum thermocouple sheath diameter when mounted in the surface of the plates to measure temperature difference between heating and cooling units 2 mm. Limits of thermocouple diameters also need to be studied and set for thermocouples inserted in the plates.</i></p> <p><i>In addition, a new clause and new criteria for thermal contact resistance are needed.</i></p> <p><i>There is also a need for a calibration method for centre-guard imbalance sensors, e.g. differential thermopile, at high temperatures.</i></p> <p><i>The implementation of the European Construction Products Regulation requires the establishment of the equivalency among European laboratories. To assess the European equivalency in high temperature thermal conductivity measurements of technical insulation products, there is a need to carry out a EURAMET regional intercomparison of guarded hot plate method with temperatures extended above 650 °C, e.g. to 750°C/800°C using the available reference materials developed within the EMRP project Thermo.</i></p> <p><i>To resolve the confusion to industry users and test laboratories caused by multiple measurement standards on the same subject, there is also a need to undertake comparisons of different measurement standards published for thermal resistance measurements by means of the guarded hot plate technique, including those published by ISO, CEN and ASTM. Currently, the definitions of the metering area are inconsistent among different measurement standards, hence also need to be reviewed.</i></p> <p><i>Estimated time frame that need shall be fulfilled: 36 months</i></p>
<b>Enclosures</b>	<input type="checkbox"/> Yes

	<input checked="" type="checkbox"/> No
<b>Are you interested in attending the STAIR EMPIR meeting of 10<sup>th</sup> October 2017 to discuss this need?</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Who should be contacted to attend this meeting? Hameury Jacques ( <a href="mailto:Jacques.Hameury@lne.fr">Jacques.Hameury@lne.fr</a> ), Alain Koenen ( <a href="mailto:alain.koenen@lne.fr">alain.koenen@lne.fr</a> ), Klaus Anhalt ( <a href="mailto:klaus.anhalt@ptb.de">klaus.anhalt@ptb.de</a> ), Radek Strnad ( <a href="mailto:rstrnad@cmi.cz">rstrnad@cmi.cz</a> ), Emese Turzó-András ( <a href="mailto:turzo-andras.emese@bfkh.gov.hu">turzo-andras.emese@bfkh.gov.hu</a> ), Søren Lindholt Andersen ( <a href="mailto:soan@teknologisk.dk">soan@teknologisk.dk</a> ) and Roland Schreiner ( <a href="mailto:Schreiner@fiw-muenchen.de">Schreiner@fiw-muenchen.de</a> ).

\*For more information, please consult:

[EMPIR website](#)

[CEN/CENELEC website "Standards and metrology"](#)